C. **LIGHTNING CREEK WATERSHED**
(tributary to Clark Fork River)

Summary
The Lightning Creek problem assessment will be completed in 2003 along with the Clark Fork River.

1. Physical and Biological Characteristics

Lightning Creek mainstem

The Lightning Creek sub-watershed, as assessed by Cacek (1989), includes over 89 square miles (230 $km^{2)}$ of land area. The creek is approximately 22 miles (35 km) long and drains into the Clark Fork River 2.5 miles (4 km) upstream from Lake Pend Oreille. This sub-watershed has five major tributary streams: Rattle, Wellington, Porcupine, East Fork, and Spring Creeks. Most of the major streams below Quartz Creek, located above these major tributaries, were listed in 1996 as water quality-limited including the five major tributaries. The geomorphology of the sub-watershed is the product of mosaic block faulting with subsequent glaciation and mass wasting. The valley side slopes are often steep (>70%) with a preference for northerly or east to southeasterly aspects. Elevations range from 2,100 feet (640 m) near the mouth of Lightning Creek to 7,000 feet (2,134 m) at Scotchman Peak. Glacial features dominate the landscape and the steep valley walls are marked by several large, ancient debris avalanches. Valley slopes show straight to concave cross sections in long profile. Areas above 5,000 feet (1,524 m) elevation are dominated by steep rock outcrops and talus-scree slopes with little if any residual soil mantle.

The Lightning Creek basin receives significantly greater precipitation, snowpack, and intense storm events than adjacent areas in northern Idaho. During the most intense storm periods, Lightning Creek can receive twice as much precipitation as nearby areas to the south and west (Cacek 1989). Bear Mountain, in the Lightning Creek watershed, averages 81 inches of precipitation annually, the highest annual precipitation anywhere in north Idaho. The watershed has shown a history of floods associated with spring melt and rain-on-snow events. Floods affecting the town of Clark Fork, the highway and the railway have occurred in 1894, 1913, 1918, 1921, 1922, and 1932. To curtail flooding of the town, a large dike was built on the east side of the creek in 1922. Between 1932 and 1964 information on flood activity is scarce. From 1964 to 1989, six major flood events have occurred at the approximate rate of one every five years. The last four events were rain-on-snow events.

Intense storm runoff, soil thickness, snowpack, temperature, and prior soil moisture are all important aspects of the triggering mechanism of landslide initiation in these shallow, erodible soils. The Lightning Creek drainage experiences debris slides, debris avalanches, earthflows, and channelized debris flow/torrents. Slides occur on all slope positions, however, an overwhelming 83% of the slides occur on lower slopes. The remaining 17% of slides, which originate on middle or upper slopes, contribute larger amounts of debris, slightly under one half the total slide volume. Seventy five percent of the total slide volume came from road and road/clearcut related

slides.

Lightning Creek is considered to be unstable, and aerial photos from the 1930's suggest that lower Lightning Creek has shifted from a primarily single channel stream to a highly braided stream with an increased width to depth ratio (Corsi et al. 1998) A barrier falls is present on Lightning Creek near Quartz Creek preventing fish passage beyond that point.

Certain Landtypes appear quite susceptible to sliding when impacted. These are Landtypes 29/57+, 24/29g and 29 (Cacek 1989). Map ___ shows the various Landtypes found in northern Idaho.

The Lightning Creek watershed has an extensive forest road system. Road erosion, road failure (slides), and culvert blockage have been large contributors of bedload and sediment to Lightning Creek (Cacek 1989). Poor road location and design (built on wood slash fill) in many areas have resulted in slides, slumps, and increased peak run-off flows; the potential for road failure is compounded by the fact that geologically, this watershed is already conducive to natural mass wasting.

Road construction has also resulted in loss of riparian forest canopy recruitment of large organic debris to the stream. The main channel is highly impacted and unstable in most reaches. Lower reaches of this stream exhibit severe bedload deposition. Bedload deposition creates fish migration barriers (intermittency) in many locations. Near its mouth, the channel is overly widened and extensively braided. The channel in this area continues to carve a new course during high spring flows each year. The railroad and highway bridges on lower Lightning Creek may be contributing to the bedload aggradation problem by constricting flows and creating a deposition area. Past road repair/maintenance in Lightning Creek has been troublesome and costly. Repair costs for the 1980 road failure/slide event alone were in excess of $875,000.

Lightning Creek, in comparison with other Pend Oreille watersheds, has been logged extensively. Over 35% of the entire watershed has had timber harvest activity (Corsi, et al. 1998). Poor harvest practices in the past have led to severe bank, bed, and channel instability along most of the mainstem. Bedload deposition, peak flows, stream temperature, and intermittency are exacerbated problems in the Lightning Creek drainage. Lightning Creek (from Quartz Creek to its confluence with the Clark Fork River) is on the 1996 303d list of water quality impaired waters as not fully supporting beneficial uses. Pollutants of concern are sediment, flow, and habitat alteration (DEQ, 1996).

2. Pollutant Source Inventory

Point Source Discharges

Nonpoint Source Discharges

2.a. Summary of Past and Present Pollution Control Efforts

3. Water Quality Concerns and Status

3.a. Applicable Water Quality Standards

3.b. Summary and Analysis of Existing Water Quality Data

3.c. Data Gaps For Determination of Support Status

4. Problem Assessment Conclusions

References

Corsi, C., DuPont J., Mosier, D., Peters, R., and Roper, B. 1998. Lake Pend Oreille Key Watershed Bull Trout Problem Assessment. Idaho Department of Health and Welfare, Division of Environmental Quality. Coeur d'Alene, Idaho.

Cacek, C. C. 1989. The relationship of mass wasting to timber harvest activities in the Lightning Creek Basin, Idaho and Montana. Eastern Washington University, Masters Thesis.

D.

RATTLE CREEK
(tributary to Lightning Creek)

Summary
The Rattle Creek problem assessment will be completed in 2003 along with the Clark Fork River.

1. Physical and Biological Characteristics

Existing information on watershed conditions in Rattle Creek indicates the system is in fair condition, with impacts to habitat a result of flooding, road construction and subsequent failures, and logging activity. A logging road parallels Rattle Creek over much of its length, and there are several stream crossings within the drainage. Rattle Creek has been significantly impacted by landslide activity (Cacek 1989).

In summary, excess bedload, loss of large woody debris, and altered water delivery and flow patterns have resulted in unstable channels. The road that parallels Rattle Creek for most of its length, reduces recruitment of large woody debris to the stream channel. Portions of the road encroach upon the floodplain and reduce floodplain capacity and function. Timber harvest has occurred in several locations in the watershed. Rattle Creek has been significantly impacted by clearcut related landslide activity (Cacek 1989).

2. Pollutant Source Inventory

Point Source Discharges

There are no established point sources in the Rattle Creek watershed.

Nonpoint Source Discharges

Excess bedload, loss of large woody debris, and altered water delivery and flow patterns have resulted in unstable channels and are believed to be major limiting factors to water quality and beneficial uses in Rattle Creek. Sources of this pollution include:

Roads - A road parallels Rattle Creek for most of its length, reducing recruitment of large woody debris and increasing the sediment load to the stream. Portions of the road encroach upon the floodplain and reduce floodplain capacity and function (Corsi, et al. 1998).

Timber Harvest - Timber harvest has occurred in several locations in the watershed. Rattle Creek has been significantly impacted by clearcut related landslide activity (Cacek 1989).

2.a. Summary of Past and Present Pollution Control Efforts

Stream habitat surveys were conducted in the Rattle Creek drainage in 1997 by Cascades Environmental, Inc. as part of WWP's hydropower relicensing process. Results of these surveys

were>>>>>>>>

Last fall the Rocky Mountain Research Station (USFS) began a longer term investigation of the relationship between stream hydrology and bull trout redd site selection and spawning success.

3. Water Quality Concerns and Status

Rattle Creek was included on the 1994 303(d) list for these pollutants of concern: sediment, flow, and habitat alteration. These pollutants were determined to be limiting beneficial uses of the stream according to the 305(b) list criteria in the State of Idaho.

Water quality data collected in 1995 near the mouth of Rattle Creek as part of the IDEQ beneficial use reconnaissance project was analyzed and the stream reach was determined to be fully supporting all established beneficial uses according to the waterbody assessment guidance and was subsequently taken off the 1996 and 1998 lists.

Rattle Creek is currently under scrutiny as a high priority watershed for bull trout recovery in the Lake Pend Oreille Key Watershed, as assessed by the Panhandle Bull Trout Technical Advisory Team. (Corsi, 1998)

3.a. Applicable Water Quality Standards

The 303(d) list is composed of streams found to be not supporting beneficial uses designated for that stream. Beneficial uses that have been designated for Rattle Creek include: Cold Water Biota, Salmonid Spawning, Primary Contact Recreation, Secondary Contact Recreation, Industrial Water Supply, Wildlife Habitat, and Aesthetics. These have all been determined according to the Waterbody Assessment Guide established by Clean Water Act revisions.

Additionally, Rattle Creek is under scrutiny as a high priority under the Lake Pend Oreille Key Watershed Bull Trout Problem Assessment for sustainable persistence of bull trout, a federally protected species under the Endangered Species Act.

3.b. Summary and Analysis of Existing Water Quality Data

Beneficial use data was collected on Rattle Creek approximately 1.3 miles from its mouth (confluence with Lightning Creek) on July 6,1995. The temperature recorded was 11°C and discharge (flow) was recorded at 32.41 cubic feet per second. The macrobiotic index (MBI - measure of macroinvertebrate community quality) was recorded at 4.92 (fully supporting Cold Water Biota), sediment was found to be 13.33% of the total substrate, and the habitat index (HI), which measures habitat quality for salmonids and other aquatic biota was 80 (determined to be needing verification. Fish data was not included, so determination of salmonid spawning cannot be confirmed. This data confirms full support for all designated uses except salmonid spawning.

There has been additional water quality data collected as part of bull trout protection efforts in the Rattle Creek watershed. Continuous temperature data collected from 7/11/98 through 10/12/98 recorded consistent (≥10 days) temperatures as high as 13°C in July and August to

approximately 9°C in October. Bull trout redds (spawning beds) have been recorded in Rattle Creek as high as 51 in 1983 (first year recorded) to as low as none (0) in 1994. There were 10 bull trout redds counted in 1996. This data would seem to support the salmonid spawning beneficial use, however marginally.

3.c. Data Gaps For Determination of Support Status

Primarily, fish community composition data would be valuable to officially confirm salmonid spawning as a beneficial use in accordance with protocols established by the Waterbody Assessment Guide. Additional monitoring in the form of collecting data from different reaches (to account for differences in land use and geography) within the watershed and to establish changes over time would also be useful.

4. Problem Assessment Conclusions

Based upon currently available IDEQ assessments, designated beneficial uses are being fully supported in Rattle Creek. Therefore, it is recommended that this waterbody be removed from the 303(d) list pending further information.

References

Cacek, C. C. 1989. The relationship of mass wasting to timber harvest activities in the Lightning Creek Basin, Idaho and Montana. Eastern Washington University, Masters Thesis.

Corsi, C., DuPont J., Mosier, D., Peters, R., and Roper, B. 1998. Lake Pend Oreille Key Watershed Bull Trout Problem Assessment. Idaho Department of Health and Welfare, Division of Environmental Quality. Coeur d'Alene, Idaho.